DEVELOPING IMPROVED MATERIALS TO SUPPORT THE HYDROGEN ECONOMY

Edison Materials Technology Center

May 24-27, 2004

This presentation does not contain any proprietary or confidential information

Objectives

Edison Materials Technology Center (**EMTEC**) will use Hydrogen, Fuel Cells & Infrastructure Program goals to find and fund projects with near term commercialization potential

- Cross cutting breakthrough materials technology
- Application specific tailored nanomaterials
- Ohio matching funds pending
- Will use EMTEC Core Technology (CT) model

EMTEC

- EMTEC is one of 7 State of Ohio Edison Centers
  - Established in 1987 by Ohio Gov. Celeste
  - 501c(3) Not for Profit
- Membership Based with Over 100 Industry, plus University, and Government Members
- Virtual – We Own no Major Capital Equipment
- Access to Over $2B in State-Of-The-Art Facilities
- Significant Experience in Ceramics, Metals, Polymers, and many Material Processes

Budget

- Total Funding: $4.5 Million +
- DOE: $2.945 Million
- State of Ohio: $1 Million
- Private: $.555 Million +
- Funding in FY03: NA- (new start in FFY04)

H_2 Generations & Barriers

H_2 production method	Barriers
Distributed H_2 production from HC	• Fuel processor capital cost • Carbon dioxide emissions • Safety
H_2 production from biomass	• Feedstock cost & availability • Efficiency of gasification technology • Fermentative Micro-organisms
H_2 production from photolysis	• Rate of hydrogen production • Materials durability & system engineering • Diurnal operation limitations & space efficiency
H_2 production from electrolysis	• System capital cost & efficiency • Electricity cost
H_2 production from high-temperature thermochemistry	• Unproven technology • High temperature materials & capital cost

H_2 Storage & Barriers

- H_2 storage system cost target: $2/kWh
- Present & future H_2 storage options

Options	Barriers
Compressed hydrogen	• Insufficient fuel storage for acceptable vehicle range • Lack of BOP components
Cryogenic hydrogen	• Hydrogen boil-off
Solid-state hydrides	• H_2 storage capacity & reversibility • Durability
Chemical hydrides	• Regeneration processes for irreversible systems • By-product removal

Fuel Cell Development Targets/Barriers

Specification	Residential	Commercial	Automotive
Scale (kWe)	1-7	35-250	40-90
Fuel	Natural gas	Natural gas	Gasoline or H_2
Life (hours)	40-120K	40-80K	3-6K
FCS cost target	300-500	300-500	25-35
Start-up/Transient	5-10	120	1/.01
Barriers	• Similar CTE matched stack material component • Durability • Cost	• Compatible stack material component • Durability • Cost	• Stack materials and manufacturing cost • Thermal management • Efficiency • Thermal & water management

Approach

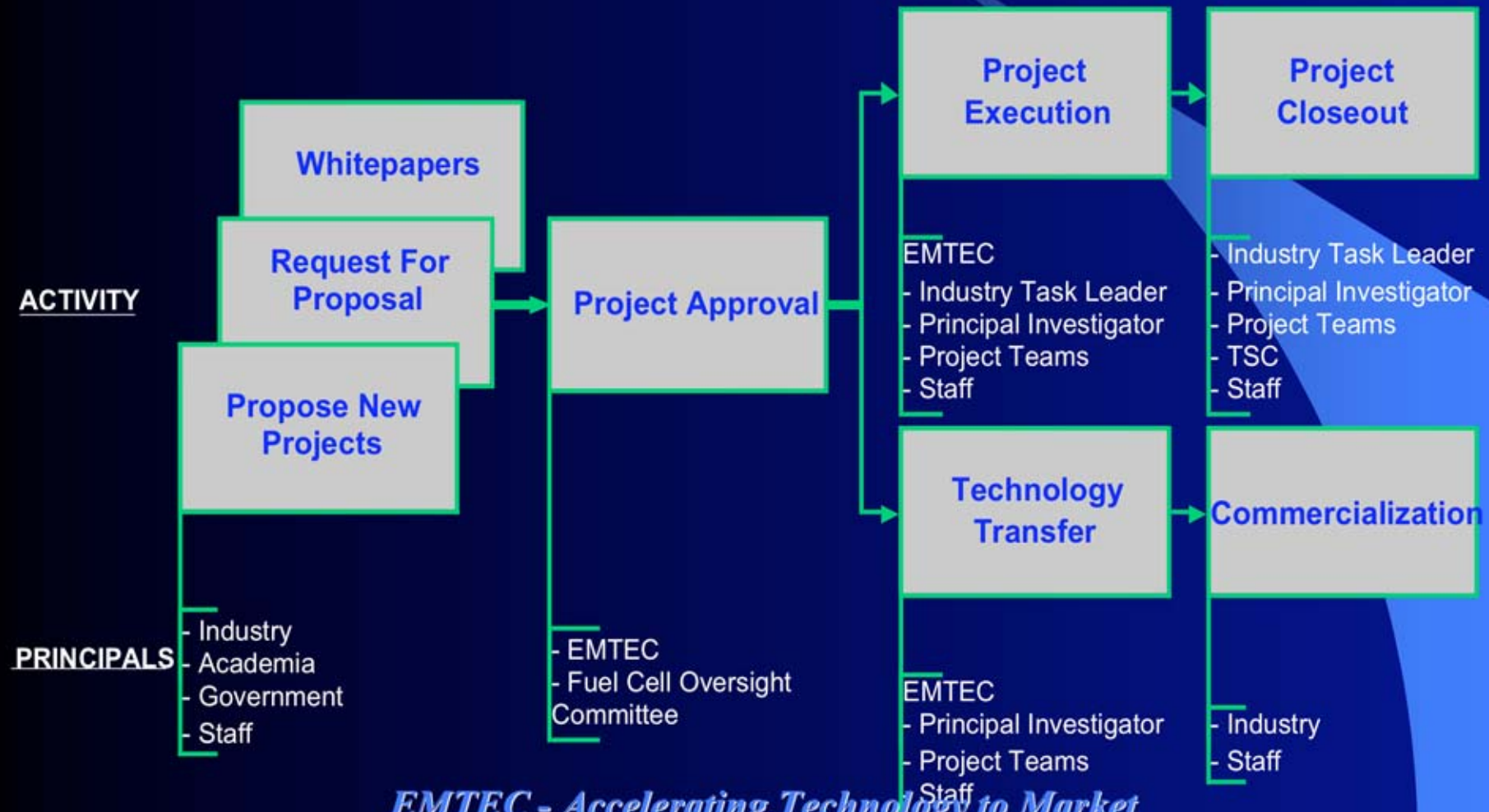
EMTEC will solicit and evaluate projects:

- Clear Project Definition
- Industry Relevance
- Appropriate Resource Level
- EERE Hydrogen Goal Alignment
- Commercialization Viability

EMTEC has extensive experience managing technology projects

EMTEC has developed a business model for selection and management of core technology

EMTEC Proposal Flow Chart



Project Safety

EMTEC will require that project proposals for hydrogen-related technology include a preliminary safety plan.

All funded projects must complete a safety plan and report as part of the project.

Project Timeline

Phase 1A
Solicit feasibility Projects
Select projects per EERE criteria

Phase 1B
Award 1 year phase 1 projects
Monitor projects and Go/NoGo milestones

Phase 1C
Performance based deliverable review

Phase 2A
Follow on justification & Phase 2 proposals
New project solicitation

Accomplishments/Progress

- FY04 funds not yet available
- Project solicitation framework in place
- Oversight committee includes DOE Hydrogen office

Interactions and Collaborations

- State of Ohio – Department of Development – Technology Division
- State of Ohio – Department of Development – Third Frontier
- USAF – AFRL Technology Transfer program
- Procurement Technical Assistance Program (PTAP)
- Manufactures Small Business Development Center (MSBDC)
- Collaborative Technology Center CTEC
- Many established relationships MOU/MOA/NDA

Future Work

EMTEC

will have an award winning program

with active DOE Hydrogen Office advocacy